

UNITED STATES PATENT OFFICE.

JOHN T. DAVIS, OF SAN FRANCISCO, CALIFORNIA.

DISTILLATION OF PETROLEUM.

SPECIFICATION forming part of Letters Patent No. 671,078, dated April 2, 1901.

Application filed July 19, 1899. Serial No. 724,412. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN T. DAVIS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Distillation of Petroleum, of which the following is a specification.

In Letters Patent of the United States granted March 14, 1899, and numbered 621,041 I describe a binding composition to unite suitable substance into a mass and increase the inflammability of a resulting fuel. That binding composition is made of asphaltum, crude petroleum, and bituminous coal. The asphaltum there employed is described as being either manufactured asphaltum, by which is meant the hard residuum from the distillation of crude petroleum, or natural asphaltum. The crude petroleum was used with the asphaltum to soften and toughen it and increase its elasticity and tenacity, it having been found that without this the manufactured asphaltum was lacking in toughness and tenacity, so that briquets of fuel made with it would in a short time fall to pieces or, if burned, crumble as soon as exposed to heat.

The object of the present invention is to produce a binder which will have the requisite toughness, tenacity, and stability without the addition of petroleum.

By the ordinary methods in which different distillates are produced at gradually-increasing temperatures and in which residuums of different consistencies or degrees of hardness result no residuum, so far as I am aware, has been produced which alone is suitable for my purpose. The reason for this is that the various distillates are drawn off from the still when the temperature reaches a given point, and thereafter the temperature is increased to make a second or a third or a fourth distillate, the residuum of each of which has a different degree of consistency or hardness. In the fractional distillation of petroleum I have found many surprising results, some of which, as in point, are given, as follows: The heavier hydrocarbon vapors that leave the body of the residuum in the still at temperatures ranging from 550° to 600° Fahrenheit or more do not pass off freely, but appear to recondense and fall back into the residuum, preventing desirable hardening of the same.

To get rid of this particular series of the hydrocarbons, air or gas has been blown or drawn through the still to act as a vehicle for carrying them off. In my efforts the temperature of the still was increased to a point at which the portion in contact with the heated iron began to carbonize; but this greatly impaired the value of the product for my purpose. The difficulty was finally overcome simply by a prolonged or continuous distillation, keeping the temperature just below the initial point of carbonization, which I found to be about 660° Fahrenheit, and continuing the distillation at about such temperature until the residuum reached the requisite consistency. The result was the production of an asphaltic product of a hardness, toughness, elasticity, and tenacity that just suits the purpose of agglomerating coal-dust into an artificial fuel, this then remaining unchanged in any climate and under any condition. To effect my purpose, then, the distillation of crude petroleum must be at a temperature that will obviate carbonizing effect and will yet produce a residuum of proper consistency. In practice I find that it is necessary to raise the temperature to and keep at a point approximating, but below, the carbonizing-point of the residuum, which is about 660° Fahrenheit, and generally this will be at least over 640° Fahrenheit. My chief procedure, therefore, consists in distilling the hydrocarbon substance after driving off the lighter hydrocarbons between the temperatures of 600° and 660° Fahrenheit, somewhat more or less, and continuing the distillation at a temperature below 660° Fahrenheit until the desired consistency is attained, all without blast or draft of air through the still, and thus by what may be termed "simple" or "plain" distillation. The proper consistency and condition of the product are ascertained by taking a sample from time to time from the still and dropping it into cold water, so that it can be examined at the normal temperature of the atmosphere. When the sample is found to be of the hardness, toughness, &c., desired, the distillation is at once stopped and the finished product removed from the still. In this form the product can be substituted for the asphaltum and crude petroleum as specified in the patent of March 14, 1899, No.

621,041. While the temperature of the still will also pass from the normal to 600° Fahrenheit, as ordinarily, yet such temperatures are merely incidental to the present procedure, where the maximum limit is a point just below carbonization.

In cases where the crude petroleum is of such a character as to contain an excessive or unusual amount of the heavier hydrocarbons—such, for instance, as paraffin—and which require high temperatures in distillation to carry them off I find it desirable to introduce a suitable oxidizing agent, such as bichromate of potash, in proper proportions, the effect of which is to hold back, solidify, and toughen these hydrocarbons, which thus become part of the asphaltic series the toughness of which is increased, and this I accomplish by adding to each ton of crude petroleum from two to five pounds of bichromate of potash, finely pulverized and thoroughly incorporated with the crude petroleum before being introduced in the still, and during the process of distillation introducing steam in a fine spray at the bottom of the petroleum, so that this steam in passing up through the mass will dissolve the bichromate and permit it to act upon the petroleum while it is being distilled, the same conditions of temperature below the carbonizing-point being observed during the process of distillation as is maintained when the oxidizing agent is not used. In the process of distillation the steam is not introduced into the still until the lighter hydrocarbons have passed off. The same effect can be produced by injecting into the still during the process of distillation bichromate of potash, in the same proportions as before, previously dissolved in hot water, preferably in a saturated solution.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The process of producing a residuum suitable for use in a binder for artificial fuel,

which consists in distilling crude petroleum to a temperature approximating to, but below, 660° Fahrenheit, and continuing the distillation at such temperature until the residuum has reached the required condition, substantially as described.

2. The process of producing a residuum suitable for use as a binder for artificial fuel, which consists in distilling crude petroleum in the presence of an oxidizing agent, and to a temperature approximating to, but below, 660° Fahrenheit, and continuing the distillation at such temperature, until the residuum has reached the condition desired, substantially as set forth.

3. The process of producing a residuum suitable for use in a binder for artificial fuel, which consists in distilling crude petroleum in the presence of bichromate of potash, and to a temperature above 600° Fahrenheit, but below the carbonizing-point of the residuum, and continuing the distillation at such temperature, until the residuum has reached the condition desired, substantially as specified.

4. The process of producing a residuum for use as a binder for artificial fuel, which consists in incorporating with crude petroleum a suitable oxidizing agent, such as bichromate of potash, then distilling the petroleum to a temperature above 600° Fahrenheit, but below the carbonizing-point of the residuum, introducing steam into the petroleum from below, in its passage upward to dissolve the oxidizing agent, and continuing the distillation at the temperature given, until the residuum has reached the condition desired, all substantially as set forth.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 10th day of July, 1899.

JNO. T. DAVIS.

Witnesses:

L. W. SEELY,
FANNY BURT.